

## **Aerial Detection Survey: 2017 Wyoming Highlights**

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### **Mountain Pine Beetle**

**Mountain pine beetle** outbreaks across Wyoming have ended and activity occurs at endemic (low) levels after large epidemics affected approximately 3.5 million acres beginning in the late 1990's. Aerially detected pine mortality attributed to bark beetles statewide totaled approximately 3,300 acres in 2017. Mountain pine beetle activity did not expand onto areas where it had not previously been observed during the recent epidemic (Figures 1 and 2).

**Northeast Wyoming** including Black Hills National Forest and adjacent lands in Crook and Weston counties –

1,800 acres of scattered ponderosa pine mortality was detected in northeastern Wyoming's Crook County and western Black Hills (Figure 3). Ground surveys indicate mountain pine beetle and ips engraver beetles are both involved. Brood surveys on the Black Hills indicate that mountain pine beetle activity is very low throughout the Black Hills region of Wyoming and South Dakota and the epidemic is over with populations returning to endemic levels.

**South central Wyoming** including Medicine Bow National Forest and adjacent lands in Carbon, Albany, Converse, Natrona, Laramie and Platte counties - Mountain pine beetle activity in this area remains low with about 400 acres of primarily limber pine affected in 2017. Dead standing trees are common, and little activity was observed in lodgepole or ponderosa pines.

**Western Wyoming** including Shoshone, Wasatch-Cache and Bridger-Teton National Forests and adjacent lands in Lincoln, Sublette, Uinta, Fremont, Park and Teton counties- Mountain pine beetle activity continued to decline and was detected on about 1,000 acres. Trees affected were primarily high elevation five needle pines. In many areas much of the mature five needle pines have been killed (figure 4).

**North central Wyoming** including Bighorn National Forest and adjacent lands in Bighorn, Johnson, Sheridan and Washakie counties- Large areas of forest remain unaffected, yet susceptible, to mountain pine beetle. In 2016, mountain pine beetle was detected on about 50 acres.

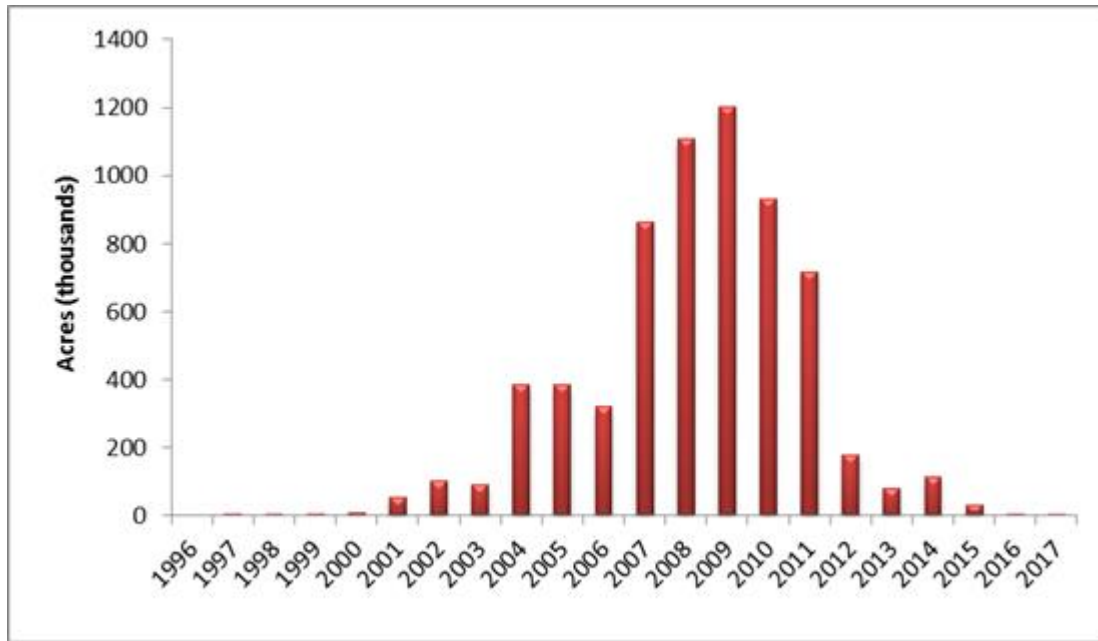


Figure 1. Annual acres of observed mountain pine beetle activity in Wyoming. Not all areas are surveyed every year.

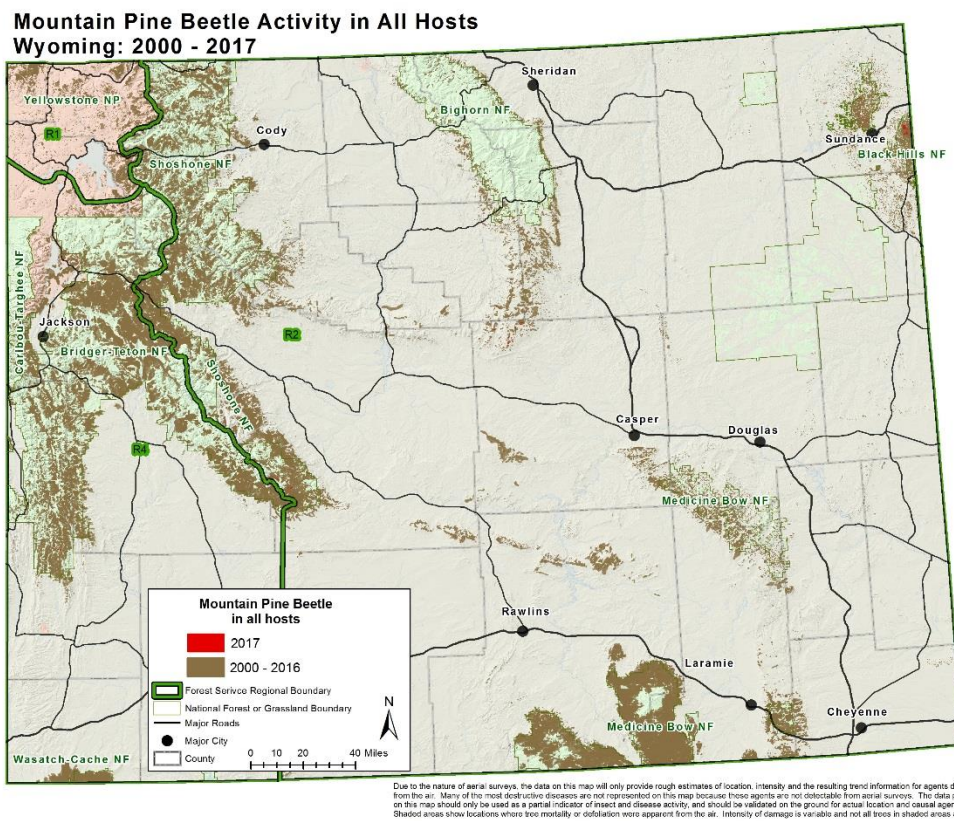


Figure 2. Mountain pine beetle activity in Wyoming 2000 – 2017.





*Figure 3. Pockets of mountain pine beetle and ips engraver beetle caused mortality in northeastern Wyoming. Photo: Justin Backsen, USDA Forest Service 2017*



*Figure 4. Whitebark pine mortality in the Absaroka Range in the Shoshone National Forest. Photo: Ryan DeSantis, Wyoming State Forestry Division 2017*

## Spruce Beetle

Spruce beetle epidemics are declining as large green trees become less abundant. Varying levels of spruce beetle activity were detected on about 28,000 acres statewide in 2017 (Figure 5 and Figure 6). Most of the new tree mortality occurred in already heavily impacted stands in western Wyoming. Since 1996, over 700,000 acres have been affected by spruce beetle statewide, leaving many areas of large dead standing spruce in higher elevations (Figure 7).

**South central Wyoming** including Medicine Bow National Forest and adjacent lands in Carbon and Albany counties- Spruce beetle-killed trees were observed on about 1,200 acres in Carbon county in areas not previously impacted. Over 120,000 acres in this area have been affected by spruce beetle since 1996, primarily on the Medicine Bow National Forest.

**Western Wyoming** including the Absaroka Mountains in and adjacent to the Shoshone and Bridger-Teton National Forests in Lincoln, Sublette, Uinta, Fremont, Hot Springs, Park and Teton counties - Spruce beetles continued to kill spruce on over 27,000 acres and many areas have few surviving mature spruce (Figure 8). Current activity is greatest in Teton, Sublette and Fremont counties. Unaffected, mature spruce stands are still abundant south of epidemic areas in the Wind River Range.

**North central Wyoming** including the Big Horn Mountains in Big Horn and Sheridan Counties- no spruce beetle activity was observed in 2017.

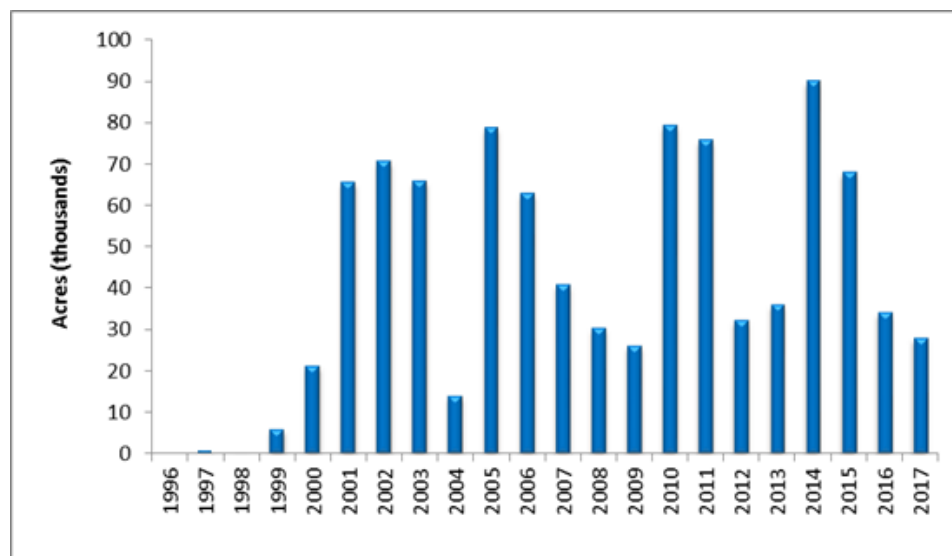
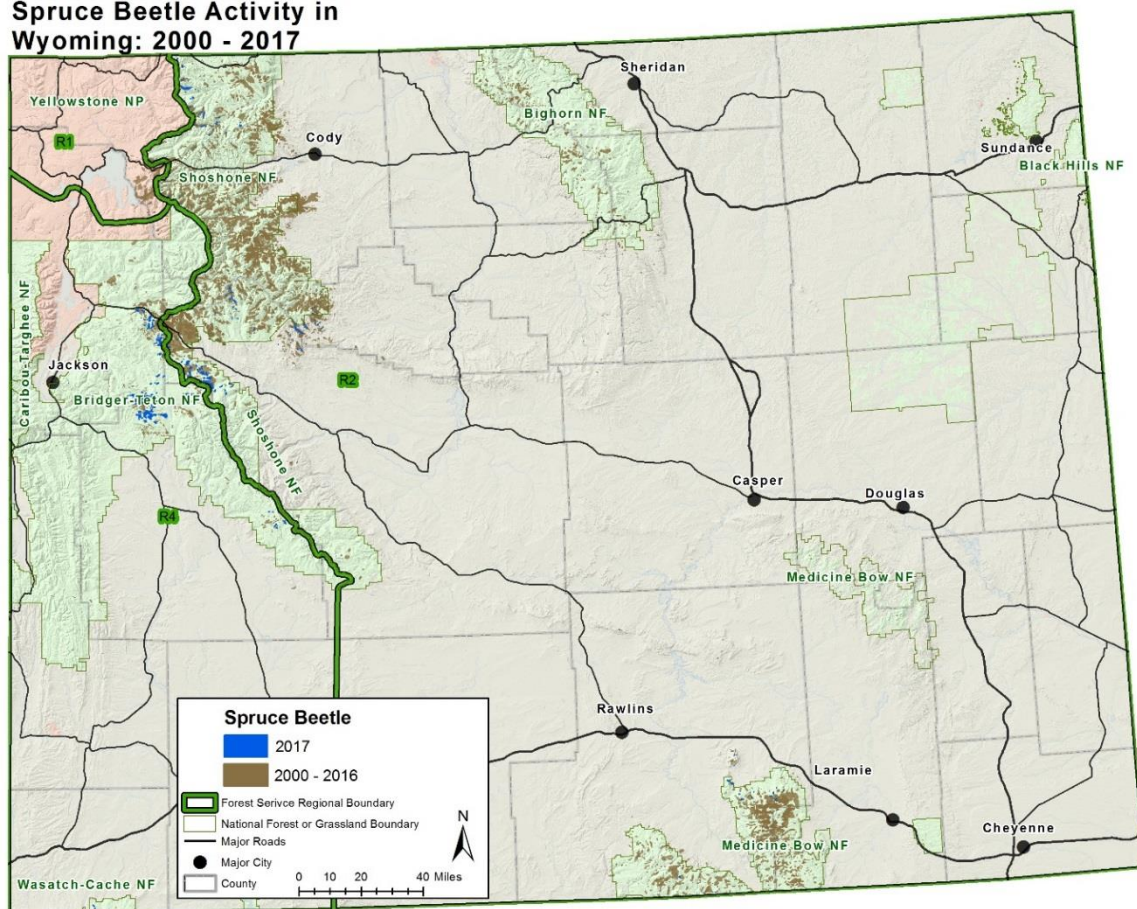


Figure 5. Annual acres of observed spruce beetle activity in Wyoming. Not all areas are surveyed every year.



# **Spruce Beetle Activity in Wyoming: 2000 - 2017**



*Figure 6. Spruce Beetle activity in Wyoming 2000 - 2017.*



*Figure 7. Dead standing spruce on the Bridger-Teton National Forest in western Wyoming. Photo: Kurt Allen, USDA Forest Service 2017.*



*Figure 8. Dead standing spruce in foreground and dead standing limber and whitebark pines in the background on the Shoshone National Forest. Photo Kurt Allen, USDA Forest Service 2017.*



**Douglas-fir Beetle-** Douglas-fir beetle populations have remained at low levels for several years with only 230 acres affected in 2017. Past epidemics in the early and mid-2000's affected over 430,000 acres and dead trees standing trees have begun to fall where they were not removed. Areas in north central Wyoming and western Wyoming saw the greatest impacts (Figure 9).



*Figure 9. Douglas-fir trees killed in the early 2000's by Douglas-fir beetle are falling in impacted areas most notably on the Bighorn and Shoshone National Forests. Photo: Kurt Allen, USDA Forest Service 2017*

**Subalpine Fir Decline** - Subalpine fir is typically killed by western balsam bark beetles and mortality may also be associated with root disease fungi, although this disease association is less apparent in Wyoming than other areas. Subalpine fir mortality is widespread across Wyoming's high elevation spruce- fir forests but intensity of tree mortality is more scattered than stand level mortality seen in associated spruce. Over successive years, accumulated mortality can become more noticeable (Figure 10). In 2017, aerial surveys detected over 15,000 acres of subalpine fir killed by western balsam bark beetle and associated fungi with varying intensity.



*Figure 10. Over time, low levels of subalpine fir mortality can accumulate into more significant levels of overstory mortality. Photo: Kurt Allen, USDA Forest Service 2017*

### **Western spruce budworm**

Defoliation of Douglas-fir, subalpine fir and less often spruce by western spruce budworm was detected on 68,000 acres, most notably in western Wyoming. Western spruce budworm larvae feed on the needles of Douglas-fir, subalpine fir and Engelmann spruce in the spring. Larval feeding can cause growth loss, top killing and tree mortality. Defoliation of large areas imparts a brownish cast to the forest (Figure 11 and Figure 12). Dense, multistoried stands of Douglas-fir are most favorable for damaging levels of western spruce budworm to build up. Thinning stands can reduce dispersing budworm survival. Forest management projects to improve forest resilience to budworm feeding are being discussed or planned on the Clarks Fork on the Northern Shoshone NF and adjacent private lands, and on Bureau of Land Management, State and private lands on the southern Bighorns. There was also new activity noted west of Lander on all land ownerships that has caused some concern.





*Figure 11. Discolored Douglas-fir from western spruce budworm feeding on the Shoshone National Forest. Photo: Kurt Allen, USDA Forest Service 2017.*



*Figure 12. Heavy western spruce budworm caused defoliation in the Clarks Fork area on the Shoshone National Forest. Photo: Kurt Allen, USDA Forest Service 2017.*



## Other Forest Health Issues not Detectable from Aerial Surveys

Many other insects and diseases can affect Wyoming's forests that are not visible during aerial surveys. White pine blister rust and dwarf mistletoes are mentioned here because of their ecological and forest management impacts statewide.

**White Pine Blister Rust** – this non-native disease affects limber and whitebark pines across Wyoming (Figure 13). These trees often occur at high elevation and are important to many wildlife species. The disease infects the needles and grows into the stem forming cankers that eventually girdle branches or the main stem of the tree (Figure 14). Main stem cankers can be lethal to young trees which are especially important after the mountain pine beetle epidemics have killed many of the mature whitebark and limber pines. USFS Scientists have identified naturally occurring genetic resistance to the disease that will be important for the future of these ecologically important Wyoming trees.

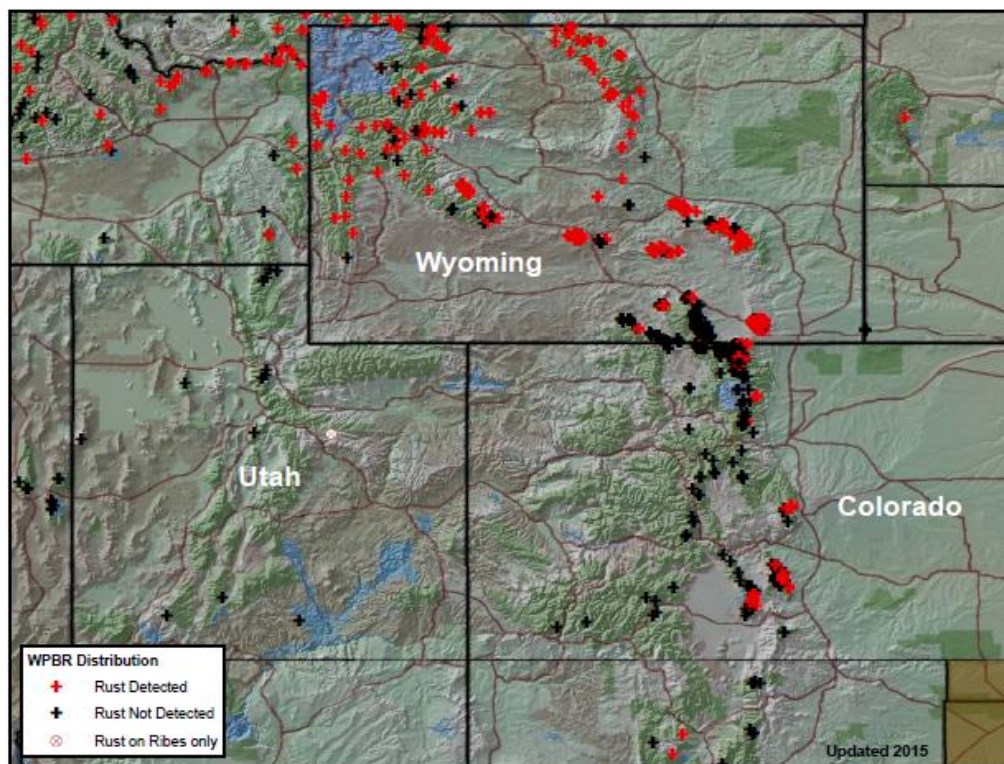
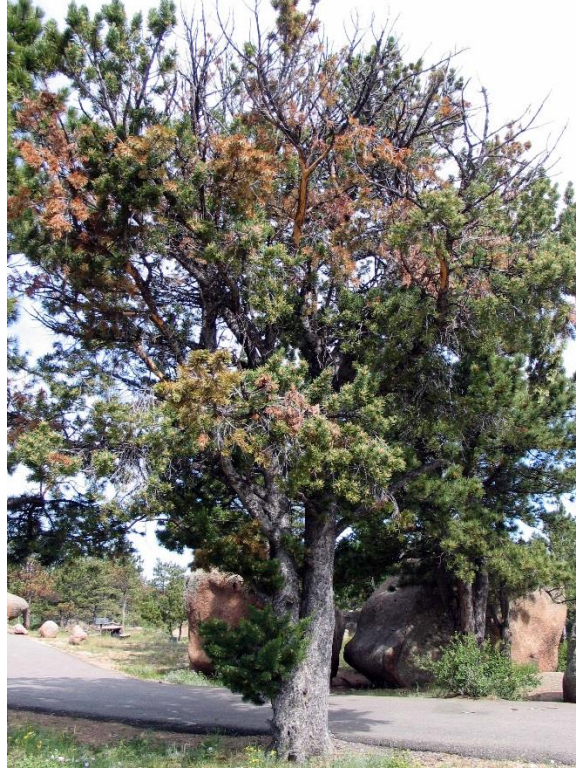


Figure 13. White pine blister rust distribution across Wyoming and neighboring states.





*Figure 14. White pine blister rust damage on limber pine at Vedawoo Recreation area on the Medicine Bow National Forest. Photo: Kelly Burns, USDA Forest Service 2016.*

**Dwarf Mistletoes** – Several species of native parasitic plants are locally common in Wyoming's forests (Figure 15). The plants can slow growth, deform and eventually kill pines and Douglas-firs in Wyoming. They are persistent and spread slowly within and to adjacent trees by exploding berries that shoot sticky seeds. Impacts can be severe on young trees growing adjacent to infected trees (Figure 16). Clearcutting is an especially effective treatment in lodgepole pine which regenerates well after disturbance (Figure 17).



*Figure 15. Dwarf mistletoe plants on lodgepole pine Photo: Kelly Burns, USDA Forest Service 2017.*



*Figure 16. Heavily dwarf mistletoe infected young lodgepole pine. Photo: Kelly Burns, USDA Forest Service 2017.*





*Figure 17. Dwarf mistletoe management on the Bighorn National Forest. Photo: Bob Cain, USDA Forest Service 2016*